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US 4317607 A US 4085986 A

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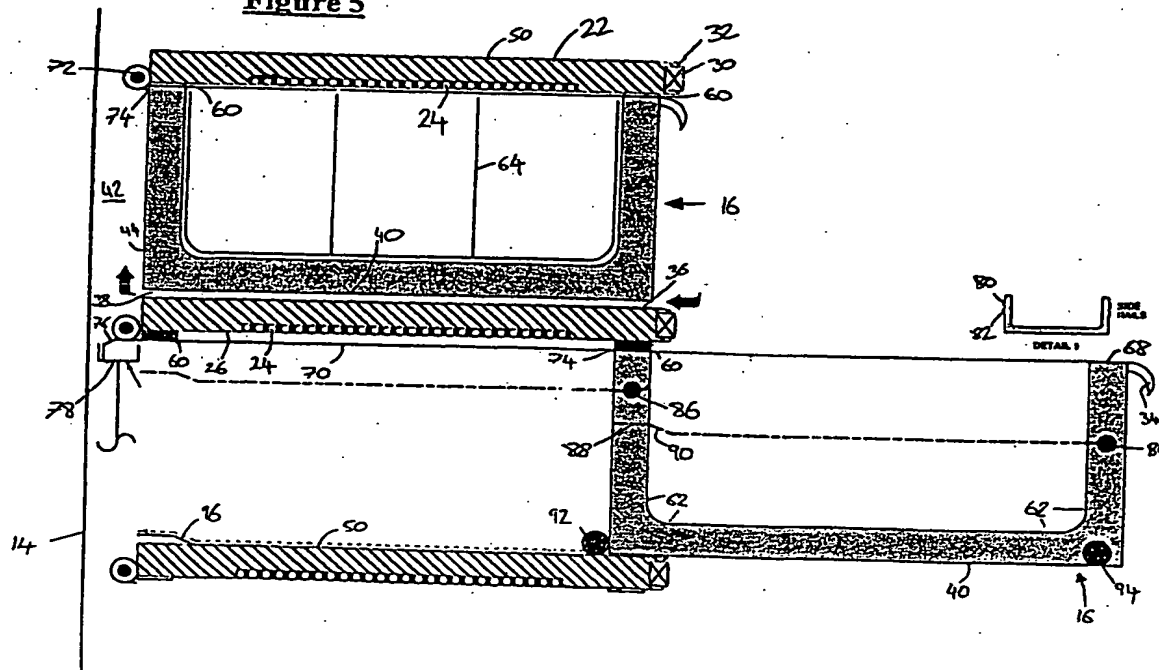
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(54) Abstract Title

Cold storage appliance

(57) A cold storage appliance comprises an open-topped insulating container 16 defining an external surface, an insulating lid 22 adapted to close the open top of the container 16, a cooling means 24 adapted to cool the interior but not the exterior of the container, and a structure supporting the container 16, the lid 22 and the cooling means 24. The container 16 is mounted to the structure for movement relative to the structure and the lid 22 to open the container 16 and afford access to its interior or to close the container 16. A majority of the external surface of the container 16 is exposed to ambient air when the container 16 is closed by the lid 22. The appliance may have shut down means for shutting down the cooling means when the container is not closed. The appliance may have a retractable screen 70 to screen the cooling means 24 when the container 16 is open.

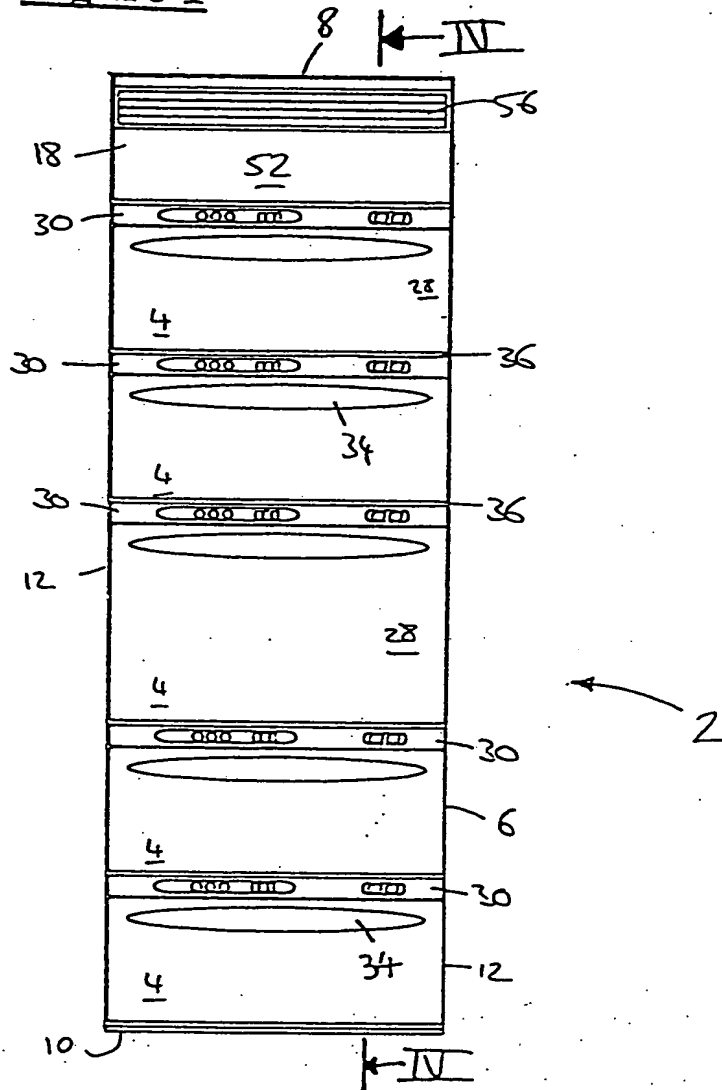
Figure 5



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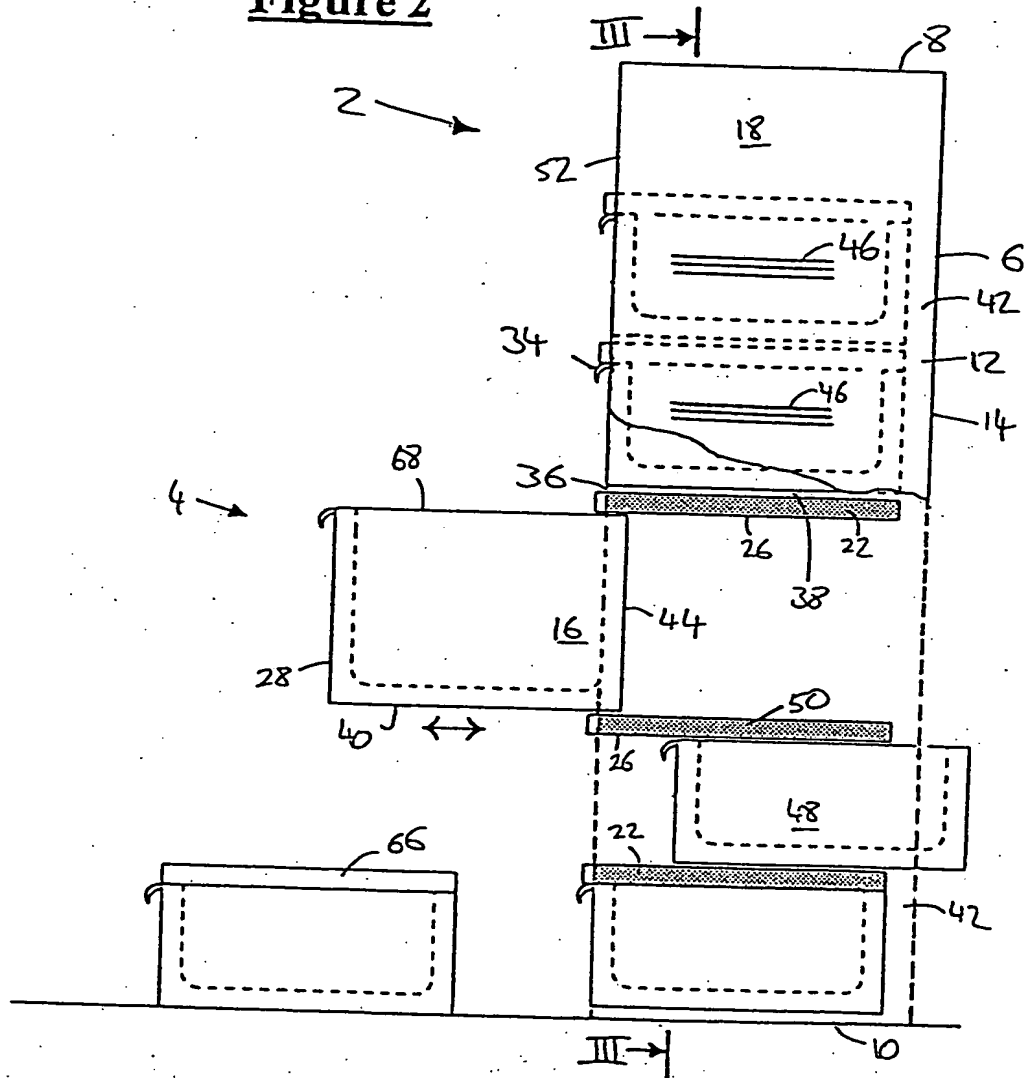
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**Figure 1**

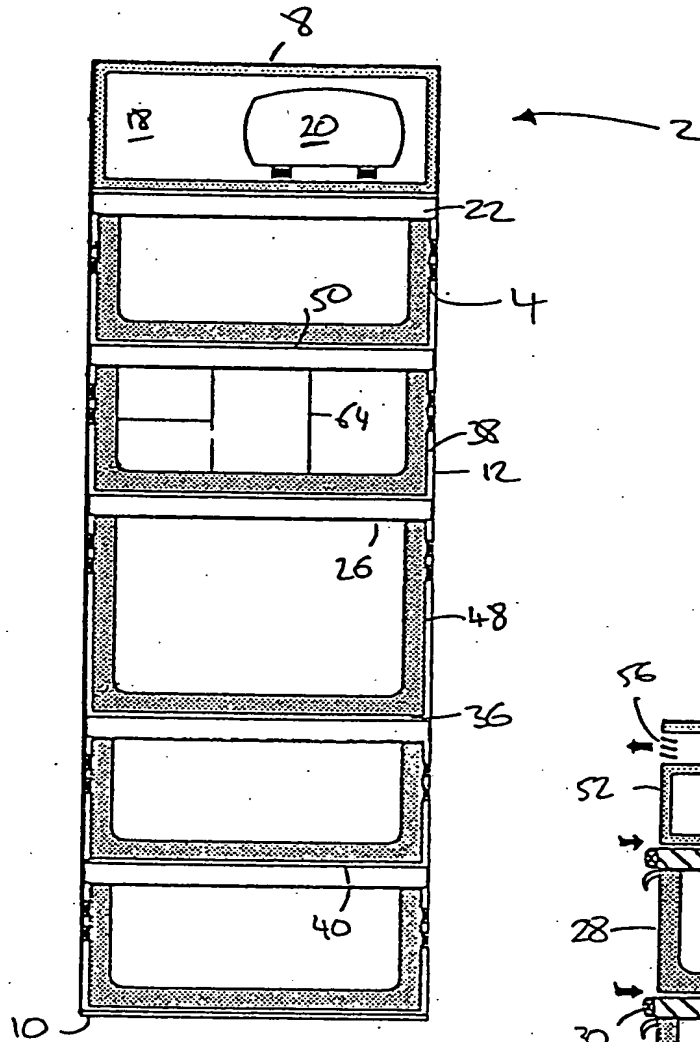


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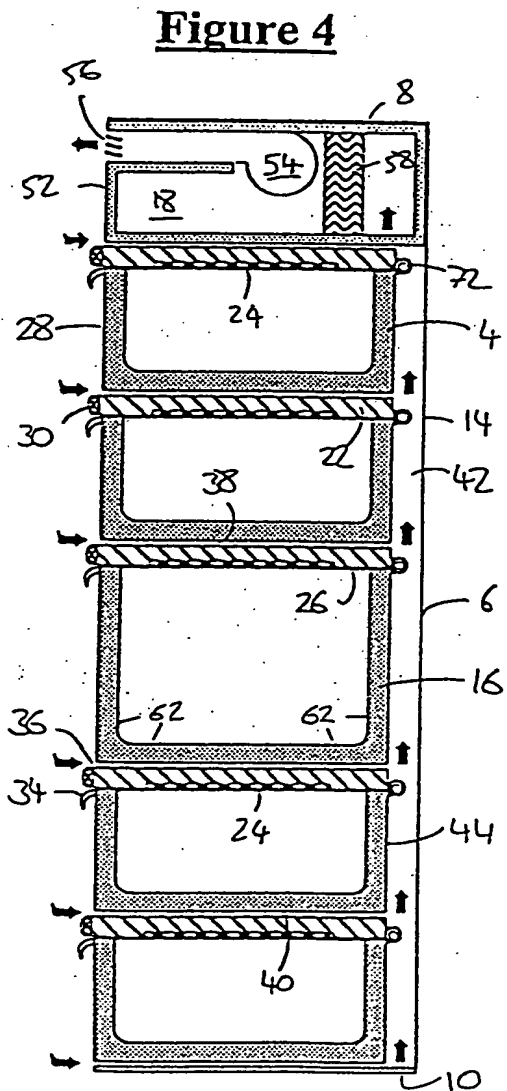
**Figure 2**



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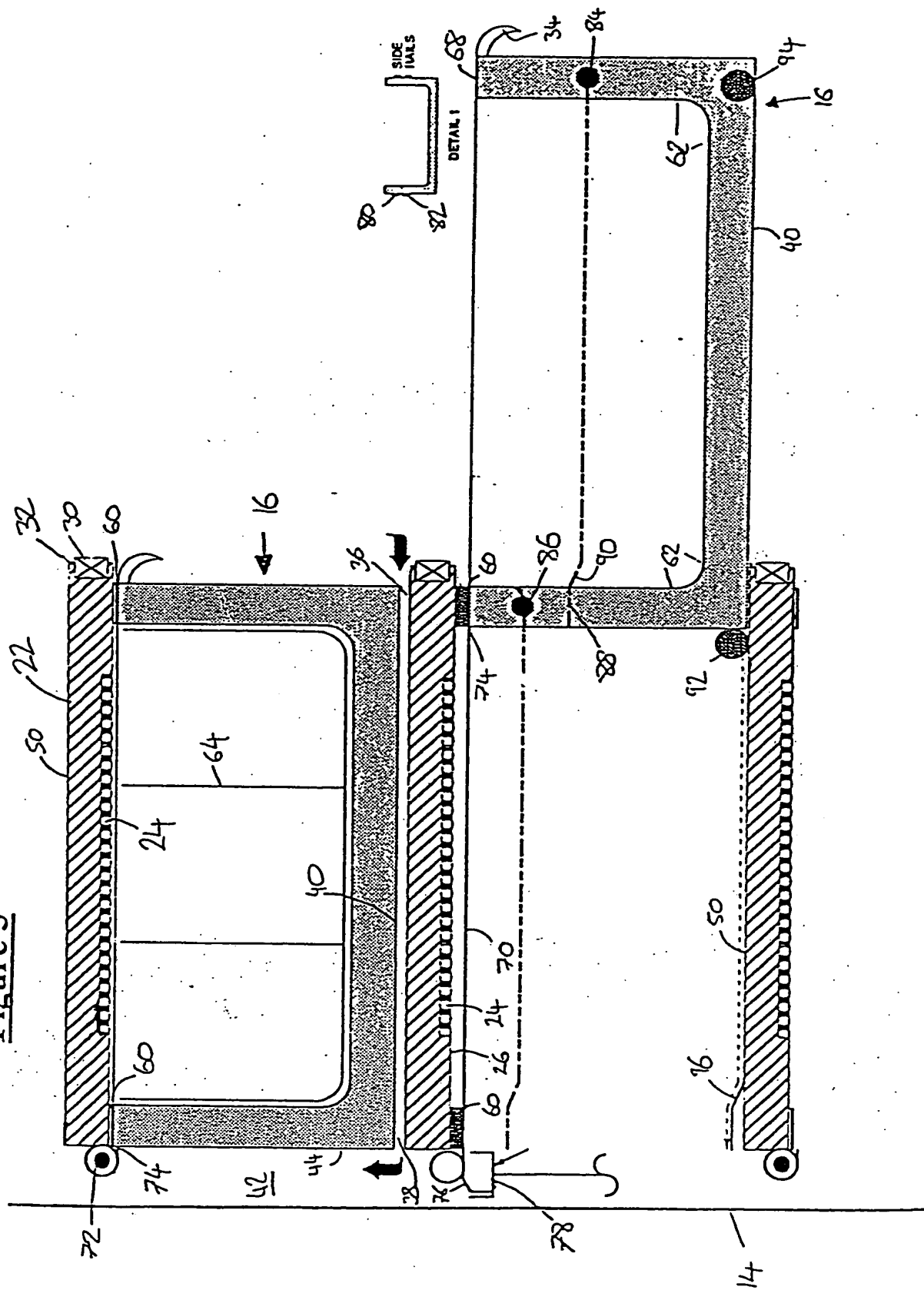


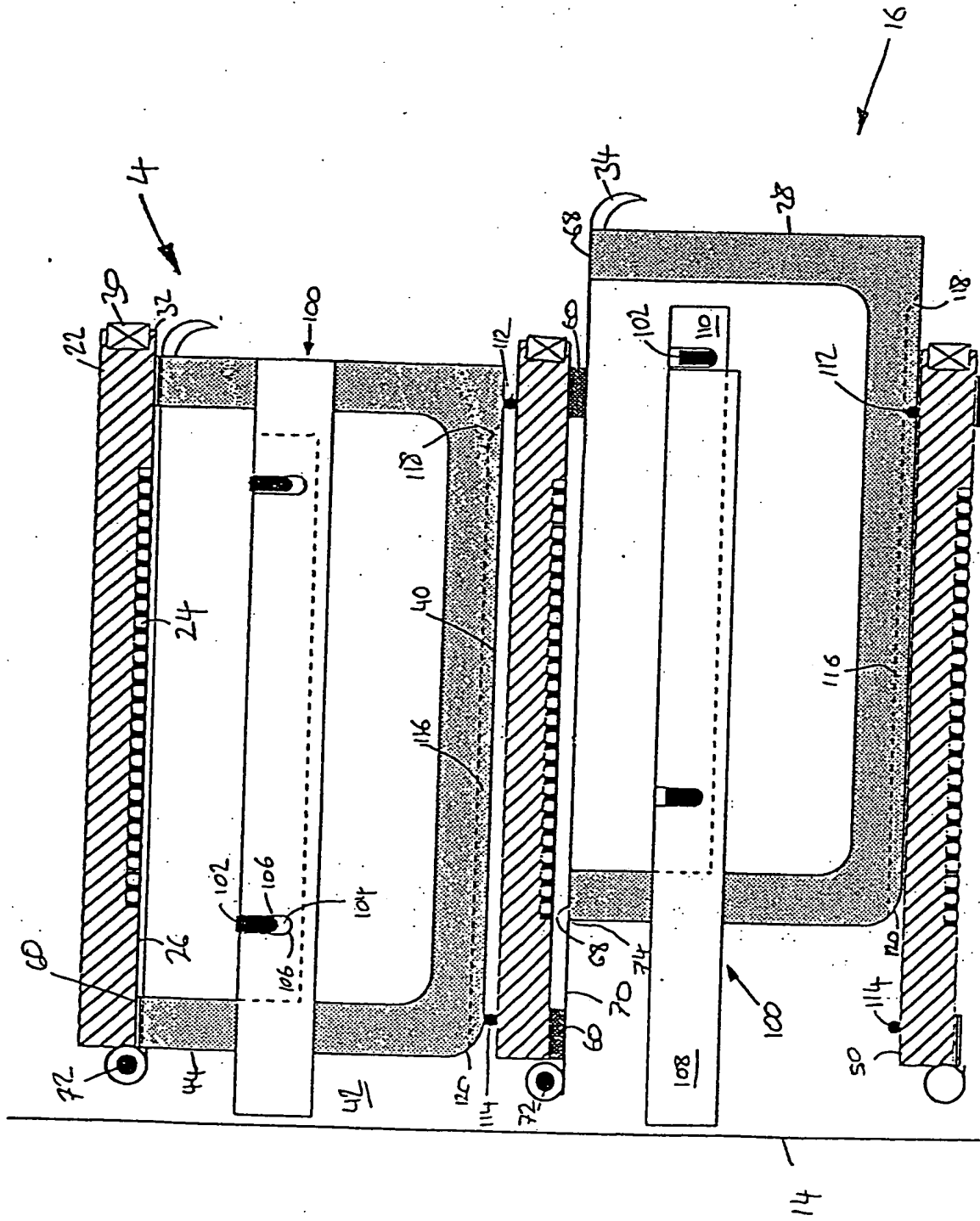
**Figure 3**



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Figure 5

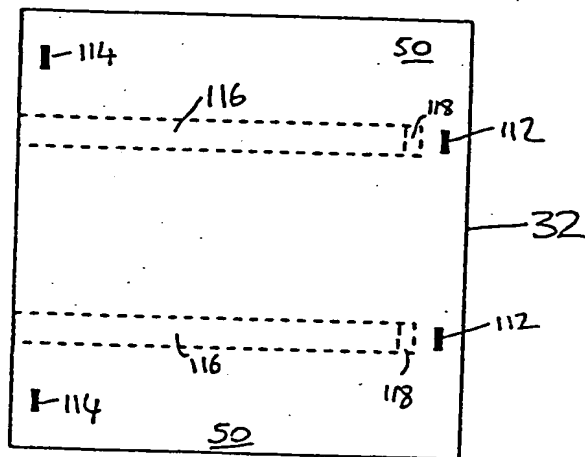




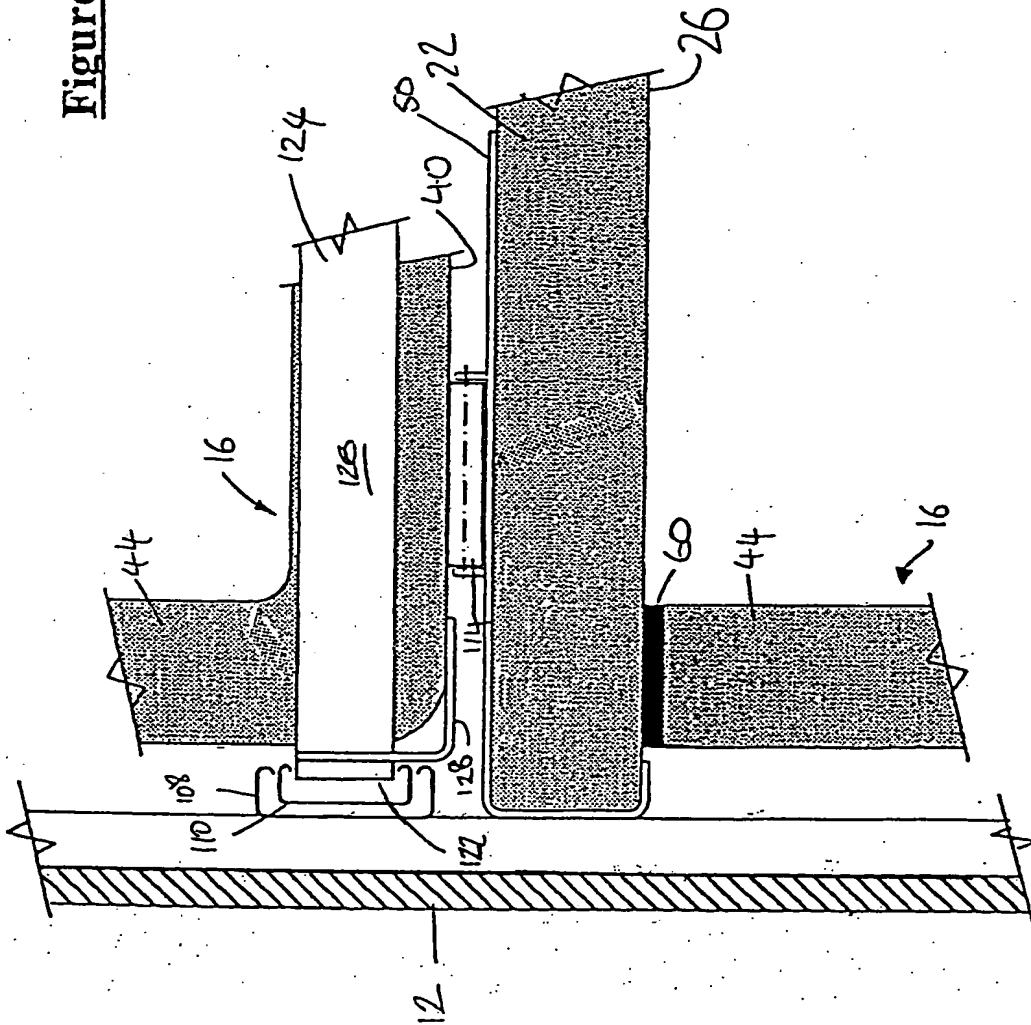
**Figure 6**

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Figure 7



**Figure 8**





**COLD-STORAGE APPLIANCE**

This invention relates to cold-storage appliances such as refrigerators and freezers for storing foodstuffs and other perishables. The invention can be applied equally well to  
5 storing any items within a cooled environment. Other applications include storage of chemicals or biological specimens.

The principal reason for storing foodstuffs in refrigerated conditions is to retard their degradation through microbial action or physiological or chemical changes, so that their  
10 shelf-life is extended for as long as possible. In order optimally to extend shelf-life through refrigeration, several factors must be considered; for example, the most suitable temperature for storing the foodstuff. In addition, some foodstuffs degrade quickly under the attack of virulent microbes that are readily circulated to other foodstuffs stored nearby, causing cross-contamination. It has long been appreciated that it is desirable to segregate  
15 different types of foodstuffs; accordingly, modern refrigerators are usually compartmentalised with the intention that the user will store similar types of food in each compartment.

As cold-storage appliances consume large amounts of power in use, energy efficiency is  
20 also an important consideration when designing such appliances. In fact, this is becoming an increasingly important consideration for consumers when they buy electrical appliances such as refrigerators, freezers, washing machines and tumble driers: retailers have responded to this by displaying energy-efficiency ratings on the front of such appliances in their showrooms. Indeed, this an EU requirement.

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The typical household refrigerator is an upright cabinet with a hinged door on its front. The door and cabinet form an airtight enclosure via a magnetic compressible seal. Substantially all of the interior of the cabinet defines a storage volume, most commonly partitioned by a number of shelves. Access to all of the shelves is gained by opening the  
30 door, which is common to all shelves. The refrigerator also houses a cooler unit situated near to its top which cools the air circulating as a convection current in which the air cooled by the cooler unit sinks to the bottom of the refrigerator around the sides of the interior storage space, and as the air is warmed, it rises up through the centre of the interior

The chest freezer helps to combat the problems of the upright refrigerator or freezer because its lid seal is not exposed to the coldest and densest air in the same manner. However, the chest configuration is inconvenient and wasteful of space because it precludes use of the space immediately above the freezer, which space must be preserved to allow the lid to be opened. Nor can items be left conveniently on top of the lid. It is also well known that large chest freezers can make access to their contents extremely difficult, it being necessary to stoop down and shift numerous heavy and painfully cold items to get to items at the bottom of the freezer compartment.

10

Moreover, both upright refrigerators and freezers and chest freezers suffer from a common disadvantage as follows. Generally, users want to access only one part of a refrigerator or freezer at a time. However, as there is generally only a single common door or lid for either a refrigerator or a freezer compartment, each time the door is opened the whole of its interior is exposed to warm ambient air, and so the whole of the interior must be cooled afresh at the expense of further energy consumption.

15

As mentioned above, segregation of different types of foodstuff is advantageous in avoiding cross-contamination. However, segregation of food is often compromised by the convection principle employed in most refrigerators. As the cooled air must chill the stored foodstuffs, it is circulated throughout the refrigerator. The substantially open baskets or shelves designed to promote circulation of air between the compartments unfortunately also promote the circulation of moisture and harmful bacteria. In addition, any liquid that may spill or leak from a foodstuff container will not be contained by the open partitions: this is particularly a problem for juices running from uncooked meats where the chances of contamination are high and the consequences of cross-contamination can be particularly severe.

20

25

As will be appreciated from the foregoing discussion, it is advantageous to divide a refrigerator into compartments, each with its own dedicated door or lid. Embodiments of this idea are disclosed in UK Patent Numbers GB 602,590, GB 581,121 and GB 579,071, all to Earle, that describe cabinet-like refrigerators. The front of the cabinet is provided

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combines with the drawer to define a compartment, the horizontal member thus being a lid for the drawer. This compartment is provided with its own cooling coils situated just below the horizontal member.

- 5 Very little detail is given about the seal that is formed between the drawer and the horizontal member, other than that the horizontal member has a downwardly projecting rear end with a biased edge that makes a close fit with the rear wall of the drawer. Nothing else is said about the junction between the drawer and the horizontal member, apart from the general statement that the drawer is adapted when in its closed position to fit 'fairly  
10 snugly' against the horizontal member. It can only be inferred that the drawer and the horizontal member merely abut against each other. Whilst this will impede the passage of air into and out of the drawer, it will not form an impervious seal. As this is not a vapour seal, icing is likely to occur even when the drawer is closed.
- 15 The drawer arrangement described creates a compartment in which a different temperature can be set when compared to the essentially common temperature of the rest of the refrigerator. It is particularly envisaged that the drawer can act as a freezer compartment. The Applicant has appreciated a disadvantage in this arrangement, namely that as the freezer drawer resides within the cooled interior when closed, the outer surfaces of the  
20 drawer within the cabinet will be cooled to the temperature of the refrigerator. Accordingly, when the drawer is opened, those cooled outer surfaces will be exposed to ambient air containing moisture that will condense on the cooled surfaces leading to an undesirable accumulation of moisture. Condensation involves transfer of latent heat from water vapour to the drawer, thus increasing the burden of cooling the drawer again when  
25 the drawer is returned to the closed position within the cabinet.

- Additionally, condensed moisture will be transferred to the interior of the refrigerator when the drawer is closed. As discussed above, the presence of water promotes microbial activity. A further disadvantage of introducing water into the interior of the refrigerator is  
30 that it may freeze: this can be a particular problem where the drawer of the enclosed compartment meets the insulated top, as any ice formation will form a seal that locks the drawer in a permanently closed position. This disadvantage was appreciated by Earle, as a

any significant temperature rise when the container is moved and hence opened.

5 The invention thus provides a cold-storage appliance having an ambient-exposed surface area enclosing a cooled compartment, in which a majority of that surface area moves upon opening the compartment whereas a minority of that surface area remains stationary. This may be contrasted with the prior art in which a majority of the ambient-exposed surface area remains stationary when the compartment is opened by moving a minority of that surface area. In that sense, the invention goes directly against conventional wisdom.

10 It is preferred that movement of the container with respect to the structure and the lid includes a major generally horizontal component of movement, to which end the container may be mounted to the structure by means running along at least one generally horizontal track. Such a track suitably includes rails, which rails are advantageously telescopic.

15 Further or in the alternative, the container can be supported by wheels or rollers running along a generally horizontal support surface.

20 In any case, to aid seal operation, movement of the container with respect to the structure and the lid preferably includes a minor generally vertical component of movement when the container is near to the lid. More specifically, the container advantageously lifts against the lid upon closing and drops away from the lid upon opening. The track or support surface may, for example, include a ramp effecting this vertical component of movement.

25 For optimum sealing, the apparatus preferably includes horizontal seal means that seal the container to the lid when the container is closed. The seal is advantageously compressible and may operate magnetically, for example electro-magnetically. The seal could alternatively be of hydraulic or pneumatic type.

30 To solve the problem of condensation as effectively as possible, it is preferred that substantially all of the external surface of the container is exposed to ambient air when the container is closed. The external surface may comprise a plurality of surface portions, such as are defined by bottom and side walls of the container. For example, the container may

The structure of the appliance may be a cabinet and/or may include a frame. The appliance can be adapted to be built-in between cupboards or other structures, for example by the removal of decorative side panels. In any event, it is preferred that the structure and/or any  
5 surrounding structure defines at least one ambient air circulation channel around the external surface of the closed container.

Means may conveniently be provided to draw in ambient air from the front of the appliance, and/or to exhaust ambient air to the front of the appliance. To this end, the  
10 structure can define a front panel including at least one opening for admission or expulsion of air. This front panel preferably further comprises control and/or display means.

For optimum circulation, the appliance preferably further comprises an impeller for promoting admission and exhaustion of ambient air.

15 It is preferred that the container is removable from the structure, so that the container can be removed for cleaning or so that it can be taken away from the appliance with its chilled or frozen contents still inside. In that latter event, an auxiliary insulated lid or cover is preferably attachable to the container upon its removal from the structure. The removed  
20 container can be used on a picnic, for example, or may be used in conjunction with a replacement container when there is a need for temporary additional cooled storage.

To afford access to a container from different sides of the appliance, the container can advantageously be moved with respect to the structure in a plurality of different directions  
25 to open the container.

To segregate and organise the interior of a container for storage of different items, means such as partitions, boxes and shelves can be provided to divide the interior of the container.

30 In preferred embodiments, the appliance of the invention has a plurality of containers, each having an associated lid and cooling means. In that case, it is much preferred that the

Figure 2 is a side view of the appliance of Figure 1, with a lower portion of a side panel removed so that the sides of the drawers can be seen;

Figure 3 is a section along line III-III of Figure 2 but with the drawers closed;

5

Figure 4 is a section along line IV-IV of Figure 1;

Figure 5 is an enlarged schematic sectional side view of two drawers of the appliance of the preceding drawings, showing one way of mounting the drawers to the appliance;

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Figure 6 is an enlarged schematic sectional side view of two drawers of an appliance in accordance with the invention, showing another way of mounting the drawers to the appliance and a way of mounting buckets removably to the drawers;

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Figure 7 is a plan view of a bucket and lid of Figure 6 showing the disposition of rollers and grooves used to mount the drawers to the appliance; and

Figure 8 is an enlarged schematic detail view of portions of two drawers of an appliance in accordance with the invention, showing yet another way of mounting the drawers to the appliance and buckets removably to the drawers.

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Figures 1 to 4 show a refrigerator/freezer appliance 2 according to an embodiment of this invention. The appliance 2 is of upright cuboidal configuration, and comprises five rectangular-fronted drawers 4 arranged one above another and housed in a cabinet 6 comprising top 8, bottom 10, side 12 and rear 14 panels. Any of these panels can be omitted if it is desired to build the appliance 2 into a gap between other supporting structures; in particular, the side panels 12 can be omitted if neighbouring cupboards can be relied upon for support or otherwise to perform the function of the side panels 12. The panels 8, 10, 12, 14 may or may not be structural but if they are not, a frame (not shown) provides support for the various parts of the appliance. If a frame is provided, it is structurally unnecessary to have panels.

25

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control and display panel 30 dedicated to that bucket 16, the panel 30 being co-planar with the front face 28. The panel 30 is supported by the front edge 32 of the appropriate lid 22, the panel 30 being recessed into the front edge 32 of the lid 22.

- 5 The control and display panel 30 contains a number of displays, switches and audible alarms, thus providing a user interface for each bucket 16. For example, the interface will most commonly be used for selecting the temperature to which the bucket 16 is to be cooled, but also contains temperature displays, on/off and fast-freeze switches, a light indicating when the drawer 4 is open and an audible alarm to indicate when the drawer 4  
10 has been open longer than a predetermined time or when the temperature inside the bucket 16 has reached an upper or lower threshold.

A rounded handle 34 extends across substantially the entire width of the top portion of the front face 28 to enable the drawer 4 to be pulled out when access to the interior of the  
15 bucket 16 is required.

The bottom of the front face 28 of each bucket 16 is bordered by a slot 36 that, as will be described, admits ambient air into the cabinet 6. To do so, each slot 36 communicates with an air gap 38 extending beneath the entire bottom face 40 of the associated bucket 16 to  
20 meet a void 42 maintained behind each bucket 16, the void 42 being defined by the inner surfaces of the back 14 and side 12 panels of the cabinet 6 and the backs 44 of the buckets 16. As can be seen particularly from Figure 4, the void 42 extends behind each bucket 16 from the base panel 10 of the cabinet 6 to communicate with the refrigerator engine compartment 18 at the top of the cabinet 6.

25

The air gaps 38 beneath the buckets 16 and the void 42 behind the buckets 16 also communicate with air gaps 38 to the sides 48 of the buckets 16. Optionally, vents 46 are provided in the side panels 12 of the cabinet 6 adjacent to the buckets 16 through which ambient air can also be admitted. As best illustrated in Figures 3 and 4, air gaps 38 extend  
30 around all bar the top side of each bucket 16, so that ambient air entering the cabinet 6 through the slots 36 can circulate freely around the sides 48, bottom 40 and rear 44 of each bucket 16. It will also be noted that ambient air can circulate freely over the top surface 50

In any event, cross-contamination would be unlikely to occur because each bucket 16 is tightly sealed when its drawer 4 is closed. So, even if microbes enter the cabinet 6, they cannot readily gain access to other buckets 16. It is also unlikely that two buckets 16  
5 would be open together at any given time. It would be possible to include means for enforcing this, for example using a mechanism akin to that used in filing cabinets for anti-tilt purposes, by preventing more than one drawer 4 being opened at a time.

When a bucket 16 is open, its open top does not suffer much spillage of cold air, and when  
10 a bucket 16 is closed, the horizontal seals 60 apt to be used in the invention are inherently better at sealing-in cold air than the vertical seals commonly used in upright refrigerators and freezers. Whilst horizontal seals are known in chest freezers, this invention does not suffer the inconvenience and space problems of chest freezers, instead being akin in those respects to the much more popular upright appliances.

15 As there has to be a large temperature gradient between the cooled inner surfaces 62 of each bucket 16 and its outer surfaces 28, 40, 44, 48, the buckets 16 are constructed from an efficient insulating material so that the gradient is easily maintained with the outer surfaces 28, 40, 44, 48 remaining at, or close to, the ambient temperature. Materials such  
20 as phenolic foam or polyurethane foam (optionally skinned with GRP or a polycarbonate in a composite structure) are particularly preferred for the construction of the buckets 16.

If segregation of the contents of a particular bucket 16 is required, that bucket 16 may be fitted with removable inserts 64. The inserts 64 are of varying shape and dimensions and  
25 may be used to define many types of compartments. For instance, an insert 64 may be a thin partition with a length corresponding to the length or width of the bucket 16 in which it is received. An insert 64 may be a box, with or without a lid, or an insert 64 may include clips for holding bottles in place or trays for holding eggs or the like. An insert 64 could also be a wire basket or shelf.

30 As can be seen in Figure 2, one or more of the buckets 16 can be removed from the appliance 2 and fitted with an insulated cover 66. The bucket 16 may then be taken away



- 30 that is recessed into the front edge 32 of the lid 22, by which the selected temperature is set, and the heat exchanger 24 works accordingly. A temperature sensor is provided (not shown) operating via a feedback loop in well-known manner to alter the operation of the heat exchanger 24 as required to maintain the selected temperature. The heat exchanger 24  
5 is connected to the refrigerator engine 20 that is also connected to all the other heat exchangers 24 of the appliance 2, the system being provided with valve means under control of the various control elements to adjust the cooling effect of each heat exchanger 24 as may be necessary to achieve the operation selected by a user.
- 10 It will be realised that each bucket 16 comprises a separate independent cooled storage area. Accordingly the temperature can be set independently so that, if desired, a different temperature can be set for each bucket 16. In fact, temperatures can be set below 0°C, so that a bucket 16 can be used as a freezer or as a refrigerator at the user's option. In this way, the appliance 2 may function as a combined refrigerator and freezer where,  
15 advantageously, the ratio of refrigerated storage space to frozen storage space can be varied easily by changing the use of one or more of the buckets 16. Of course, it will be appreciated that the drawers 4 can all be used as refrigerators or can all be used as freezers so that, in effect, the appliance 2 becomes either a dedicated refrigerator or freezer.
- 20 It will also be seen from Figures 5 and 6 that a screen 70 is provided for each drawer 16, the screen 70 being made from a thin flexible sheet material. The purpose of the screen 70 is to underlie the otherwise exposed heat exchanger 24 and the rest of the cold bottom surface 26 of the lid 22 when the drawer 4 is open. This is intended to prevent, as much as possible, warming of the bottom surface 26 of the lid 22 or cooling of the substantially  
25 ambient-temperature air within the cabinet 6.
- In the embodiments illustrated, as a drawer 4 is closed, the screen 70 is a flexible sheet that rolls itself onto a reel 72, so that it can be stored compactly within the ambient-exposed void 42 at the rear of the buckets 16. Each reel 72 is positioned adjacent to the  
30 lower rear edge of each lid 22, each reel 72 and its associated screen 70 extending across the width of the lid 22.

means can include a contact switch (not shown) positioned at the rear of the lid 22 so that the back 44 of a bucket 16 presses against the switch to close the switch when the drawer 4 is closed. When the drawer 4 is opened, the contact is broken and the heat exchanger 24 is switched off until the drawer 4 is closed once more. This facility is particularly useful  
5 when a bucket 16 is removed from the appliance 2 for a period of time, so that the user does not have to remember to turn off the associated heat exchanger 24.

Referring now to the features specific to the embodiment of Figures 1 to 5, the mechanism for opening and closing a drawer 4 comprises a pair of rails 80, 82 provided on each side  
10 48 of a bucket 16 to hold the bucket 16 when the drawer 4 is open. The rails 80, 82 are attached to the side panels 12 of the cabinet 6 and are disposed one above another on each side of the bucket 16 as best shown in Figure 3.

Four wheels 84, 86 are mounted to the sides 48 of the bucket 16 to engage with the  
15 respective rails 80, 82. These wheels 84, 86 are only shown on the lower bucket 16 of Figure 5 and are disposed in two pairs, one front pair 84, and one rear pair 86, the front pair 84 being at a lower level than rear pair 86 so that the rear pair 86 engages the upper rails 80 and the front pair 84 engages the lower rails 82. Only one wheel of each pair 84, 86 can be seen in the side view of Figure 5.

20 The lower rails 82, at least, are telescopic so as to remain engaged with the front wheels 84 when the drawer 4 is open. All of the rails 80, 82 terminate at their rear ends in an elevated portion 88 behind a ramp 90 whereby, when a drawer 4 is being closed, the wheels 84, 86 travel rearwardly along the respective rails 80, 82 and up the ramps 90 onto the elevated  
25 portions 88. In this way, the bucket 16 moves upwardly near the end of its horizontal rearward travel so that its top edge 68 is forced upwards to compress the associated seal 60. Conversely, when the wheels 84, 86 travel forwardly along the rails 80, 82 as the drawer 4 is being opened, the wheels 80, 82 travel back down the ramps 90 to clear the bucket 16 from the seal 60.

30 The bucket 16 optionally also includes four lower wheels 92, 94 mounted at the bottom 40 of the bucket 16. These lower wheels 92, 94 are again only shown on the lower bucket 16

are of a diameter sufficient to span the air gap 38 beneath each bucket 16, and are disposed in two pairs, one front pair 112 and one rear pair 114.

As seen in the plan view of Figure 7, the front pair of rollers 112 are relatively close  
5 together and are aligned with parallel grooves 116 provided in the underside 40 of the bucket 16, the grooves 116 extending from the back edge of the underside 40 to near the front edge of the underside 40, terminating in an inclined end face 118. The grooves 116 receive the front pair of rollers 112 when the drawer 4 is open, as shown in the lower drawer 4 of Figure 6. It will also be noted that the bucket 16 is clear of the rear pair of  
10 rollers 114 in this position. As none of the rollers 112, 114 bear against the bucket 16 in this position, its weight is supported fully by the rails 100 and the lugs 102 are seated against the base of the slots 104.

When the drawer 4 is closed, the bucket 16 travels horizontally backwards on its rails 100,  
15 initially without the rollers 112, 114 making contact with the underside 40 of the bucket 16. When the drawer 4 is nearly closed, however, the rear rollers 114 make contact with the rounded lower rear edge 120 of the bucket 16. The grooves 116 are of such a length that as the rear rollers 114 make contact with the lower rear edge 120 of the bucket 16, the front rollers 112 make contact with the inclined end faces 118 of the grooves 116.  
20 Consequently, as the drawer 4 is pushed further back towards its closed position, the rounded lower back edge 120 of the bucket 16 and the inclined end faces 118 of the grooves 116 ride up and over the rollers 112, 114 so that the bucket 16 is lifted upwards. The lugs 102 ride up their slots 104 to permit this movement, whereupon the top edge 68 of the bucket 16 is forced against the compressible seal 60. In this position, the weight of  
25 the bucket 16 and its contents is removed from the rails 100, the rollers 112, 114 bearing the weight instead.

In reverse, when the drawer 4 is opened, the bucket 16 moves downwards and forwards as the lower rear edge 120 clears the rear rollers 114 and the front rollers 112 are received  
30 again in the grooves 116. Once clear of the rollers 112, 114, the bucket 16 supported on the rails 100 can travel freely to its fully open position with the support of the rails 100.

4. In this way, the screen 70 may be left attached to the cradle 124 at all times, irrespective of whether or not a bucket 16 is still within the cradle 124, so that there is no need to engage or disengage the screen 70 from the bucket 16 whenever a bucket 16 is placed in or removed from the drawer 4.

5

In all of the above embodiments, viewing means may be provided to assist a user in viewing the contents of any bucket 16 that is too high to be viewed easily from above through its open top. At its simplest, a window may be provided in the front and/or bottom of a bucket 16. Another way of viewing the contents would be to place a mirror above the open bucket 16, the mirror being angled to provide a view from above the bucket 16 even though the user's eye line is below the mirror and possibly also below the bucket 16. Preferably, the mirror is retractable when not needed for use, for example being hinged to the front panel 52 of the refrigerator engine compartment 18 - the mirror can even constitute that panel 52 - or being foldable out of the front of a bucket 16. Even if the bucket 16 is a little above the user's head, the benefit of a view from above means that it will usually be possible to reach into the bucket 16 to access its contents as desired.

Many other variations are possible within the inventive concept. For example, rather than employing the vertical array of drawers 4 common to the embodiments described above, a side-by-side arrangement of drawers 4 is also contemplated. Indeed, it is possible to have any number of drawers, from one upwards, and to have any desired arrangement of drawers.

The configuration of air gaps 38 around the buckets 16 may be varied without departing from the inventive concept. Furthermore, the circulation of air around the interior of the cabinet 6 can be assisted in several ways.

Whilst the buckets 16 described above are largely rectangular in shape as this is optimally space-efficient, any polygonal or rounded shape may be adopted, even a hemisphere. Of course, a wide variety of bucket sizes and depths is possible within the inventive concept.

**CLAIMS**

1. A cold-storage appliance including:

5           an open-topped insulating container defining an external surface;

          an insulating lid adapted to close the open top of the container;

          a cooling means adapted to cool the interior but not the exterior of the container;  
10          and

          a structure supporting the container, the lid and the cooling means;

          wherein the container is mounted to the structure for movement relative to the structure  
15          and the lid to open the container and afford access to its interior or to close the container,  
          and wherein at least a majority of the external surface of the container is exposed to  
          ambient air when the container is closed by the lid.

2. The appliance of Claim 1, wherein movement of the container with respect to the  
20          structure and the lid includes a major generally horizontal component of movement.

3. The appliance of Claim 2, wherein the container is mounted to the structure by means  
          running along at least one generally horizontal track.

25          4. The appliance of Claim 3, wherein the track includes at least one rail.

5. The appliance of Claim 4, wherein the or each rail is telescopic.

6. The appliance of any of Claims 2 to 5, wherein the container is supported by wheels or  
30          rollers running along a generally horizontal support surface.

7. The appliance of any preceding Claim, wherein movement of the container with respect

18. The appliance of any preceding Claim, wherein the container is generally cuboidal.

19. The appliance of any preceding Claim, wherein the cooling means is associated with the lid.

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20. The appliance of Claim 19, wherein the cooling means is integral with the lid.

21. The appliance of Claim 19 or Claim 20, wherein the cooling means is substantially flush with the underside of the lid.

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22. The appliance of any preceding Claim, further including shut-down means for shutting down the cooling means when the container is not closed.

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23. The appliance of Claim 22, wherein the shut-down means includes a switch closed by presence of the container.

24. The appliance of any preceding Claim, wherein a retractable screen is extensible to screen the cooling means when the container is open.

20

25. The appliance of Claim 24, wherein the screen is attached at one end to the structure and at an opposed end to the container or to means associated with the container.

26. The appliance of Claim 24 or Claim 25, wherein the screen is removably attached to the means associated with the container.

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27. The appliance of Claim 26, further including retaining means for retaining the screen in a wholly or partially extended configuration when the screen is detached from the container.

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28. The appliance of any of Claims 24 to 27, wherein the screen is exposed to ambient air when retracted.

41. The appliance of any preceding Claim, further including means for exhausting ambient air to the front of the appliance.

5 42. The appliance of any preceding Claim, further comprising an impeller for promoting admission and exhaustion of ambient air.

43. The appliance of any preceding Claim, wherein the container is removable from the structure.

10

44. The appliance of Claim 43, wherein an auxiliary lid is attachable to the container when removed from the structure.

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45. The appliance of Claim 43 or Claim 44 when dependant from Claim 25 or from any Claim dependent from Claim 25, wherein the means associated with the container is a movable cradle adapted to receive the container.

46. The appliance of any preceding Claim, wherein the container can be moved with respect to the structure in a plurality of different directions to open the container.

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47. The appliance of any preceding Claim, further comprising means for dividing the interior of the container.

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48. The appliance of any preceding Claim and having a plurality of containers, each having an associated lid and cooling means.

49. The appliance of Claim 48, wherein the respective cooling means are independently controllable.

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50. The appliance of Claim 48 or Claim 49, wherein the cooling means are connected to a common refrigerator engine.



Application No: GB 9921564.2  
Claims searched: 1-60

31.

Examiner: Kalim Yasseen  
Date of search: 24 November 1999

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.Q): F4H (H2A, H2B, H2C, H2D, H2E, H2F, H2G, H2H, H2K, H2L, H2M)  
Int Cl (Ed.6): A47F (3/04); F25D (13/00, 13/02, 13/04, 17/04, 19/02, 25/00, 25/02, 29/00)  
Other: Online: EPODOC, JAPIO, WPI

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 0 948 223 A (GENERAL) see container 46 with lid 48	
A	GB 0 602 329 A (GUYON) see insulated drawer 41 with cooling means 56 and lid 54	
A	US 5 120 118 A (RANKIN) a freezer having individual pull-out drawers	
A	US 4 317 607 A (GOMOLKA) a compartmented container	
A	US 4 085 986 A (TAUB) an auxiliary refrigerated display case	

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.